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Attorney Docket No. 2003B044/2 US

REMARKS

This reply is in response to the Office Action dated November 2, 2006. Claims 1-6, 8-16, 18-28, 30 and 31 are pending in the application. Claims 1, 4, 8-14, 18-28, and 30 stand rejected. Claims 2, 3, 5, 6, 15, 16 and 31 stand objected to for being dependent on a rejected base claim but would be allowable if rewritten in independent form. Applicant has cancelled claims 2, 6, and 16 without prejudice and added new claims 32-55 for reasons discussed below. No new matter has been added. Entry of the foregoing amendment and reconsideration of the claims is respectfully requested.

Claim objections

Claims 2, 3, 5, 6, 15, 16 and 31 stand objected to for being dependent on a rejected base claim but would be allowable if rewritten in independent form. Applicant has cancelled claims 2, 6, and 16 without prejudice and added new claims 32-55 to present the allowable subject matter identified in claims 2, 6 and 16 in independent form. More specifically, Applicant has cancelled claim 2 without prejudice and added new base claim 32 to present the allowable subject matter of claim 2 in independent form. Applicant has also cancelled claim 6 without prejudice and added new base claim 40 to present the allowable subject matter of claim 6 in independent form. Finally, Applicant has cancelled claim 16 without prejudice and added new base claim 48 to present the allowable subject matter of claim 16 in independent form. As such, base claims 32, 40 and 48 as well as the claims dependent therefrom are in condition for allowance. Allowance of new claims 32-55 is respectfully requested.

Claim rejections

Claims 1, 4, 8, 9, 10-14, 18-28 and 30 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Fujita et al. (U.S. Patent No. 6,143,911; hereafter "Fujita"). The Examiner states that the process and catalyst taught in Fujita is "essentially the same" as that recited in the instant claims. The Examiner then states, "A reasonable basis exists to believe that the corresponding product produced by the process of the prior art exhibits essentially the same properties." The

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Examiner then states, "the burden of proof is shifted to the Applicants to establish an unobvious difference."

Applicant respectfully traverses the rejection on grounds that Fujita does not teach, show or suggest the claimed invention. At minimum, Fujita does not teach, show or suggest a propylene copolymer comprising at least 50 wt% units derived from propylene; from 5 wt% to about 28 wt% of the comonomer; a ratio of  $g'$  greater than or equal to 1.10 (as determined by the claimed formula); and a weight average molecular weight of 20,000 to 1,000,000 g/mol, as required in every claim.

In the present invention, the effect of the comonomer addition is significant and surprising. The present invention relates to a method for preparing unique propylene polymers using a single species of metallocene catalyst that, in a single reactor, can surprisingly produce propylene copolymers having a broad composition distribution, specifically increasing comonomer content with increasing molecular weight." Specification at page 2, ll. 26-30. "It is well established that molecular weight, crystallinity, and melting point decrease substantially as comonomer content increases." Specification at page 2, ll. 12-14. In other words, it is expected to see a narrow Mw/Mn product with a narrow composition distribution. However, the present invention provided copolymers having a high weight average molecular weight (20,000 to 1,000,000 g/mol), narrow Mw/Mn and broad composition distribution ( $g' \geq 1.10$ ) as illustrated in Figures 1 and 2. Referring to Figures 1 and 2, less comonomer (i.e. ethylene) addition was observed in the low Mw end and more comonomer (i.e. ethylene) addition was observed in the high Mw end. See, Figure 1 and page 35, line 4 through page 36, line 2. This observation was surprising. In fact, the opposite was expected because, as noted above, it is expected to see a narrow Mw/Mn product with a narrow composition distribution (i.e.  $g'$  around 1.0), not a broad composition distribution. See Figures 1 and 2 where the comparative examples showed about the same comonomer addition at the low Mw end as at the high Mw end. The difference in  $g'$  from 1.0 to 1.1 is significant in both kind and degree. Accordingly, it is not obvious, inherent or otherwise expected, nor is there a reasonable basis to believe that the corresponding product produced by the process of Fujita exhibits essentially the same properties. Therefore, the claimed invention is both novel and not obvious in view of Fujita. Withdrawal of the rejection and allowance of the claims is respectfully requested.

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Furthermore, neither the examples nor the detailed description of Fujita teach, show or suggest the claimed combination of a carbon-bridged, hafnocene used to make a propylene copolymer having at least 50 wt% units derived from propylene; from 5 wt% to about 28 wt% of the comonomer; and a weight average molecular weight of 20,000 to 1,000,000 g/mol, as required in every claim. It is believed that this specific combination of properties is required to provide a propylene copolymer having a narrow MWD and a broad composition distribution (i.e.  $g' \geq 1.10$ ).

Admittedly, Fujita discloses a list of various monomers and states that a mixture of two or more can be used. Fujita at col. 8, line 53 through col. 9, line 5. However, Fujita makes no specific reference or indicates any desirability toward propylene-ethylene copolymers, and certainly makes no reference or indicates any desirability toward a propylene copolymer having 5 wt% to about 28 wt% of the comonomer and a weight average molecular weight of 20,000 to 1,000,000 g/mol. In Example 2, Fujita discloses a propylene-hexene copolymer produced from a ethylenebis-(2-methylindenyl) zirconium dichloride. When we look at example 2 a bit more closely we can glean a few important pieces of information. First the reaction had a minimal amount of hexene present such that only 0.59 mole % was incorporated. This means that it was physically impossible for the propylene-hexene copolymer made in example 2 to have the unique comonomer distribution that Applicant's claims require ( $g'$  ratio). Specifically there was not enough hexene present to get an uneven distribution of more comonomer in the higher molecular weight chains. Theoretically, to do so would have required that most or all of the comonomer be inserted in the longer chains and the reactivity ratios of the two monomers (hexene and propylene) are too close to one another for this to happen at this low a hexene concentration in the polymerization reactor. Second, when we compare Example 2 with Example 1 we note that there is a melting point depression from 134.3°C to 131.4°C, a 2.9°C difference. It is known that there is generally a 5.5 °C depression in melting point per mole of comonomer for metallocene propylene polymers having even distribution of comonomer among the chains. Example 2 reports the hexene to be present at 0.59 mole%.  $0.59 \text{ mol} \times 5.5 \text{ }^{\circ}\text{C/mol} = 3.2 \text{ }^{\circ}\text{C}$ . This correlates directly with the 2.9°C depression expected. This is evidence that the polymer produced in example 2 does not have Applicant's uneven distribution of comonomer (which is reflected in the  $g'$  ratio  $\geq 1.10$  required in the claims). Thus, we can say with a level of certainty that the copolymer produced in Example 2 does not inherently have the required product properties of Applicant's claimed invention.

Because it is believed and shown above that a specific combination of comonomer content (5-28 wt%) and carbon-bridged hafnocene is required to produce a propylene copolymer having a narrow MWD *and* broad composition distribution ( $g' \geq 1.10$ ) and Applicant has shown example 2 does not have the required  $g'$  ratio, there is no reasonable basis to conclude that Fujita teaches, shows or suggests the claimed invention. Therefore, withdrawal of the rejection and allowance of the claims is respectfully requested.

Furthermore, the laundry list disclosed in Fujita at col. 8, line 53 through col. 9, line 5, simply provides an "obvious to try" situation. An invention is merely "obvious to try" if the prior art gives either no indication of which parameters are critical or no direction as to which of many possible choices is likely to be successful. Merck & Co. Inc. v. Biocraft Laboratories Inc., 10 USPQ2d 1843 (Fed. Cir. 1989). As stated above, Fujita makes no indication or direction as to the comonomer content in combination with the weight average molecular weight of a propylene copolymer. Therefore, Fujita failed to recognize the critical parameters and cannot be used to provide a "reasonable basis" to arrive at the claimed invention. Withdrawal of the rejection and allowance of the claims is respectfully requested.

Finally, with regard to Fujita it is important to note that one of the heralded benefits of metallocenes has been their unique capacity to produce polymers having narrow composition distribution (i.e. even distribution of the comonomers across the various polymer chains.) In the Ziegler-Natta copolymers that came before the metallocene copolymers, the comonomers were unevenly loaded in the lower molecular weight chains. When metallocenes proved so different from the prevailing Ziegler-Natta standard, the industry was excited by the possibilities presented. Applicant's claimed invention differs from both of these ancestors. Applicant's process produces polymers that have the comonomer unevenly loaded into the higher molecular weight chains. When this application was filed, this was considered astonishing. Up until that point, it was not thought that certain metallocenes could unevenly distribute comonomer among the polymer chains, specifically to the higher molecular weight chains. This unique feature is reflected in the  $g'$  ratio, which as page 13, line 12, *et seq.* describes, is related to the intrinsic viscosity of the fractions in question. Intrinsic viscosity is, *inter alia*, related to comonomer content. Thus both the old Ziegler Natta copolymers and the prior metallocene copolymers cannot have Applicant's unique  $g'$  ratio because they do not have the comonomer loaded into the higher molecular weight chains.

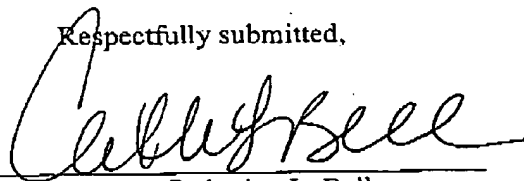
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In light of the above Applicant respectfully request that the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) over Fujita be withdrawn.

Claim 30 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Winter et al. (U.S. Patent No. 5,304,614; hereafter "Winter"). Applicant has amended claim 30 so that R<sup>14</sup> and R<sup>15</sup> are not optional, obviating this rejection. Accordingly, claim 30 is not obvious in view of Winter for reasons previously stated by the Examiner. Withdrawal of the rejection and allowance of the claims is respectfully requested.

Having addressed all issues set out in the office action, Applicant respectfully submits that the pending claims are now in condition for allowance. Applicant invites the Examiner to telephone the undersigned attorney if there are any issues outstanding which have not been addressed to the Examiner's satisfaction. A petition for extension of time for filing this response is attached; however, in the event that petition becomes separated from this Response, the Commissioner is hereby authorized to charge counsel's Deposit Account No. 05-1712, for any fees, including extension of time fees and excess claim fees, required to make this response timely and acceptable to the Office.

Respectfully submitted,



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